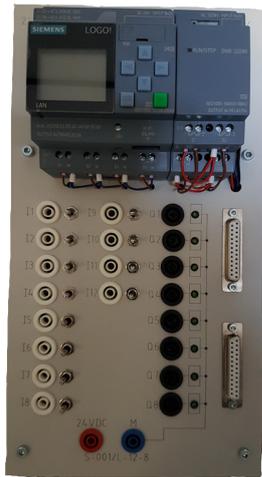


# Trainingsssystem



# PLC Function-Simulators

# Contents

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# Trainingsssystem PLC / Function-Simulators / MCS-coupling

## The advantage's of this didactic system:

All Didactic-Equipment from our house follows the same concept: All elements for education are compatible.

Components from Pneumatics, Electrics, Hydraulics and PLC with Function-Simulators can be use in this different Systems.

Now, we have three different PLC-Systems from SIEMENS integrated.

### **LOGO!**

**S7-1200 series**

**S7-1500 series**

All this Equipment is constructed on DIN A4 subplate (297 mm height) for any Electric Lab or specially height of your request:

Also, every PLC is possible to integrate it in our other equipment Range like

**Pneumatics or  
Hydraulics**

**all equipment can be use in all different Systems.**

The **Teachware** is from our house. Thats the result from 30 years know how in seminars for the systems above. Additionally for every PLC system we are deliver specified document from the due hardware.



# PLC - Unit's - LOGO!



Description

Order - No.

## LOGO!-Small control

S-001-8-4

- o Basic unit with display
- o 24 VDC
- o 8 Inputs (2 for analogous useable)  
All Input's with Digital-Simulator (toggle and detent)
- o 4 Outputs (Transistor, 0.5 A), with LED
- o all In-and-Outputs with safety plugs and with SUB-D-plug for MCS-Module's
- o quick connection in ER-frame on the top of the bench
- o System width 150 mm
- o Height: 297 mm (A4)



Description

Order - No.

## LOGO!-Small control

S-001-12-8

- o Basic unit with Extension with display
- o 24 VDC
- o 12 Inputs (2 for analogous useable)  
All Input's with Digital-Simulator (toggle and detent)
- o 8 Outputs (Transistor, 0.5 A), with LED
- o all In-and-Outputs with safety plugs and with SUB-D-plug's
- o 2 SUB-D connector for two MCS-Module
- o quick connection in ER-frame on the top of the bench
- o System width 150 mm
- o Height: 297 mm (A4)

Description

Order - No.

<b>PLC</b>	<b>S - 100-1215C PN-MCS2</b>
------------	------------------------------

- o Basic unit with Power supply
- o 24 VDC
- o 14 Inputs, digital
- o All Input's with Digital-Simulator (toggle and detent) and LED
- o 10 Outputs (Transistor, 0.5 A), with LED
- o 2 Analogue Input's (0-10 V)
- o 2 Analogue Output's (0-10 V)
- o all In-and-Outputs with safety plugs and with SUB-D-plug for MCS-Module's
- o 2 Potentiometer for analoguous Simulation
- o 2 BCD-Display's to Show analogue signal' on the top of the bench
- o Height: 297 mm (A4)
- o including Alu-frame for Top table
- o incl. TIA PORTAL light
- o incl. Ethernet cable



Digital Voltage Display is direct conneted with SUB-D 1 to measure the height of the workpieces, if you connect MCS-520 there, or to show the voltage on the safety plug (Switch).



Switch is on top position: Voltage from MA, down position: Voltage from the safety plug (IW 64)



Switch is on top position: Voltage from Speed control of a module with SC-Version, down position: Voltage from the safety plug (QW 64)

Description

Order - No.

**PLC**

**1215C PN-MCS-700**

**Data**

- o PLC - S7-1200-series (CPU 1215C PN)
- o Power supply 24 VDC, 2.5 A
- o 30 digital Inputs, 23 are for MCS,  
7 free useable on safety plug's and Switches/detent for Simulation
- o 18 digital Output's, 24 DC / 0.5 A, 16 are for MCS,  
2 free useable on safety plug's and LED
- o 2 analogous Input's, +-10 V, Resolution 16 Bit, 1 are for MCS,  
1 free useable on safety plug and a Potentiometer for Simulation
- o 2 analogous Output's, 0 - 20 mA, Resolution 16 Bit on safety plug's with current / voltage display
- o Execution time:80 ns (Bit operation), 230 ns (Word operation)
- o integrated High-Speed-Counter for countings up to 20 KHz
- o Word operations, addition's ....
- o Programm memory 125 KByte, Data 4 MByte
- o 8192 Marker, all useable as Holding marker adjustable
- o Timer, Limited only by the storage capacity
- o Counter, Limited only by the storage capacity, all remanent adjustable
- o Ethernet-connection
- o programmable with PC-Software (TIA PORTAL LIGHT)
- o integrated Digital- and Analogous simulator
- o Integrated Top table device in Aluminum
- o SUB-D ports for 5 MCS-Module's (MCS-700)
- o including Alu-frame for Top table
- o incl. TIA PORTAL light
- o incl. Ethernet cable



Description

Order - No.

**PLC**

**S7-1215C PN -MCS-760**

**Data**

- o PLC - S7-1200 (CPU 1215C PN)
- o Power supply 24 VDC
- o 62 digital Inputs, 50 are for MCS,  
12 free useable on safety plug's and Switches/detent for Simulation
- o 46 digital Output's, 24 DC / 0.5 A, 41 are for MCS,  
5 free useable on safety plug's and LED
- o 2 analogous Input's, 0-10 V, Resolution 11 Bit, 1 are for MCS,  
1 free useable on safety plug's and a Potentiometer for Simulation
- o 2 analogous Output's, 0-10 V, Resolution 11 Bit on safety plug's with display
- o Execution time:80 ns (Bit operation), 170 ns (Word operation)
- o integrated High-Speed-Counter for countings up to 100 KHz
- o Word operations, addition's ....
- o Programm memory 125 KByte, Data 1 MByte
- o 16 KByte Marker, all useable as Holding marker adjustable
- o 2048 Timer, all remanent adjustable 10 ms till 9990 s
- o 2048 Counter, all remanent adjustable
- o Ethernet-connection
- o programmable with PC-Software (TIA PORTAL) and STEP 7 Basic (included)
- o integrated Digital- and Analogous simulator
- o Integrated Top table device in Aluminum
- o SUB-D ports frr 10 MCS-Module's (MCS-760)
- o including Alu-frame for Top table
- o incl. TIA PORTAL light
- o incl. Ethernet cable



For other solutions like MCS-690, 700, 720, 730, 740, you can use this PLC and you can expand later to bigger solution like MCS-760.

Description

Order - No.

PLC

S7-1215C PN - S-490

Data

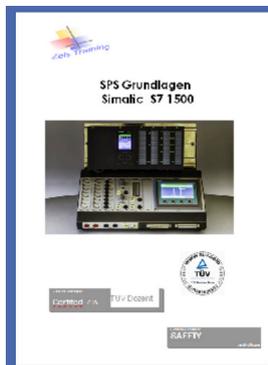
- o PLC - S7-1200 (CPU 1215C PN)
- o Power supply 24 VDC, 2.5 A
- o 16 digital Inputs  
14 free useable
- o 24 digital Output's, 24 DC / 0.5 A  
2 free useable
- o 2 analogous Input's, 0-10 V, Resolution 11 Bit,  
1 for Elevator connected on SUB-D to measure the position with a ultrasonic Sensor (IW 64)  
1 free useable on safety plug's and a Potentiometer for Simulation (IW 66)
- o 2 analogous Output's,  
1 for Elevator to set the speed of the cabine, 0-10V, Resolution 11 Bit (QW 64)  
1 free useable, +-20 mA, Resolution 11 Bit (QW 66)
- o Execution time:80 ns (Bit operation), 170 ns (Word operation)
- o integrated High-Speed-Counter for countings up to 100 KHz
- o Word operations, addition's ....
- o Programm memory 125 KByte, Data 1 MByte
- o 16 KByte Marker, all useable as holding marker adjustable
- o 2048 Timer, all remanent adjustable 10 ms till 9990 s
- o 2048 Counter, all remanent adjustable
- o Ethernet-connection
- o programmable with PC-Software (TIA PORTAL light), including with Ethernet cable
- o Integrated top table device in Aluminum
- o 2 SUB-D ports for connecting to Elevator (cable is including)

In the complete set comes the PLC with an example program (programmed with TIA PORTAL)



# Teachware-1200

All Teachware are in paper form or on CD as word file: /P or /CD



Description

Order - No.

## Basic´s

TEW-1200-1

Contents:

Basics, hardware S7 1200, construction technology, creation of a PLC program, programming, basic functions, memory commands, time and counting functions, test functions



## Project planning

TEW-1200-2

Contents:

Types of blocks, word processing, time and counting words, comparison functions, data blocks, temporary and static variables, parameterizable FCs and FBs, instance data blocks, multi-instance data blocks, block protection, analog value processing, organization blocks



## Ethernet networking

TEW-1200-3

Contents:

The Ethernet interface, the Profi-Net, sensor actuator bus system (ASI) with CP CM 1243-2 and power module DCM 1271, Networking of two CPUs1214, Networking CPU with KTP 600, Networking CPU 1214 with Logo 7.0, Decentralized I/O with ET 200SDrive technology with frequency converter G120



## Visualisation

TEW-1200-4

Contents:

Operating and monitoring automation devices, TIA V12 programming software or higher  
Creating a project,  
Configuring input and output fields, bars, buttons, curves, graphics, buttons, color changes,  
Configuring messages, recipes, configuring function keys, user administration

## Description

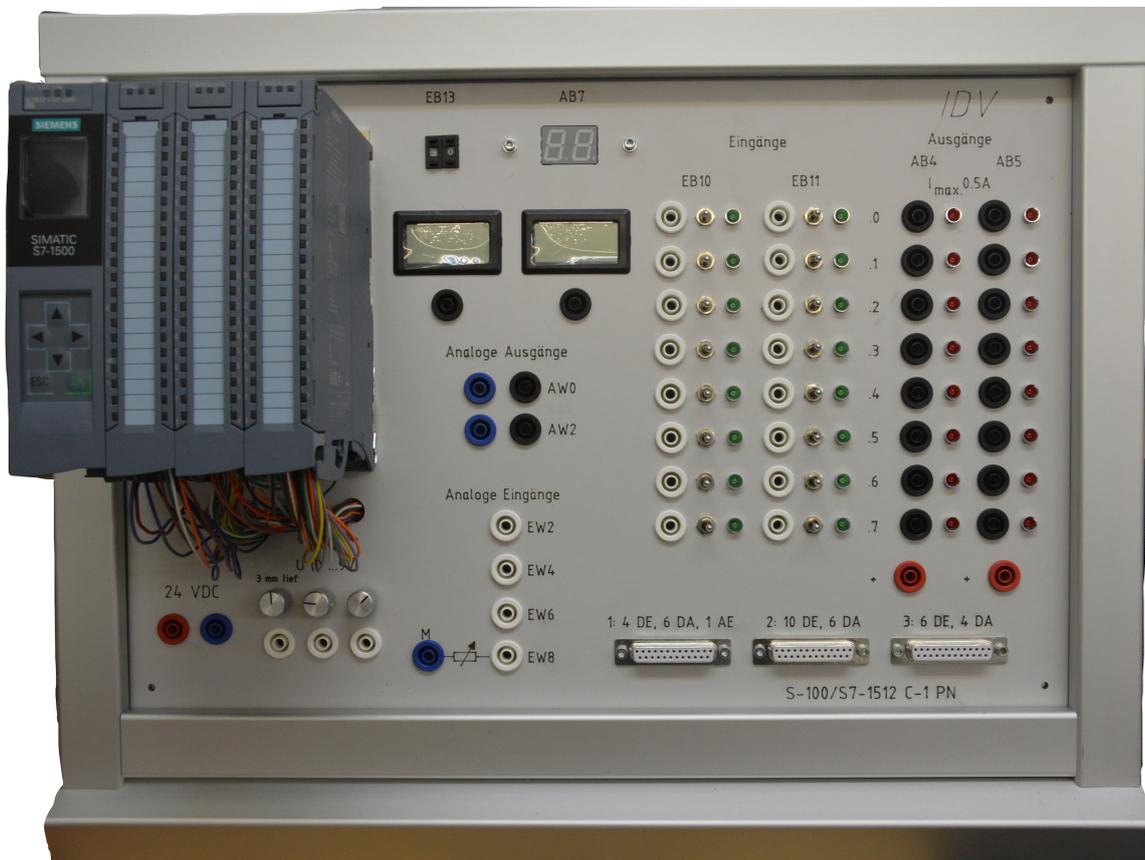
## Order - No.

**PLC**

**S-100 S7-1512C PN**

### Data

- o PLC - S7-1500-series (CPU 1512C PN)
  - o 32 digital Inputs, 20 are for MCS,  
16 free useable on safety plug´s and Switches/detent for Simulation with LED  
8 Input´s connected to A BCD-Chooser
  - o 32 digital Output´s, 24 DC / 0.5 A, 16 are for MCS,  
16 free useable on safety plug´s and LED  
8 Output´s connected to a BCD-Display
- some of the In-and Output´s used As Double function
- o 4 analogous Input´s, 0-10 V, Resolution 16 Bit, 1 are for MCS,  
3 free useable on safety plug and each Potentiometer for Simulation
  - o 1 analogous Input for resistance and Temperature (Pt 100)
  - o 2 analogous Output´s, 0 - 10 V, Resolution 16 Bit on safety plug´s with each voltage display
  - o Execution time:48 ns (Bit operation), 58 ns (Word operation)
  - o integrated High-Speed-Counter for countings up to 400 KHz
  - o Word operations, addition´s ....
  - o Programm memory 250 KByte, Data 1 MByte
  - o 16 KByte Marker, all useable as Holding marker adjustable
  - o 2048 Timer, all remanent adjustable
  - o 2048 Counter, all remanent adjustable
  - o 2 x Ethernet-connection
  - o programmable with PC-Software (TIA PORTAL Professional), including
  - o integrated Digital- and Analogous simulator
  - o SUB-D ports for 3 MCS-Module´s (MCS-700)
  - o including Alu-frame for Top table
  - o incl. TIA PORTAL Professional
  - o incl. Ethernet cable



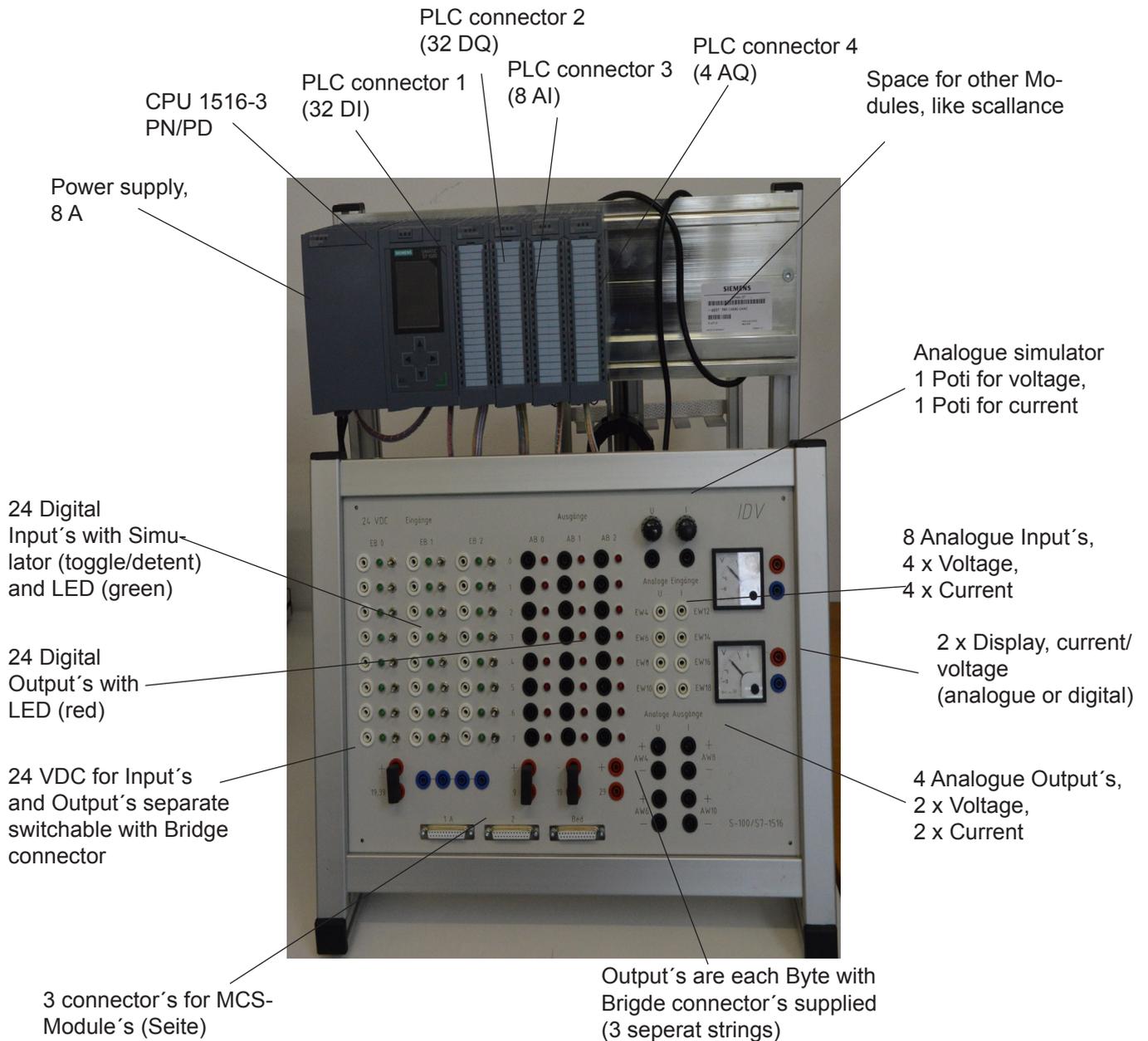
Description

Order - No.

PLC

S-100 S7-1516-3 PN/DP

Data



\* The analog inputs and outputs are wired according to the description above. If you would like to use an input or output as a power input/output, please note the instructions in the SIEMENS manuals. Observe the maximum load in the technical descriptions from Siemens!! Otherwise there is a risk of destruction

Description

Order - No.

PLC

S7-1512 C-MCS 760

**Data**

- o PLC - S7-1500 (CPU 1512C PN)
- o Power supply 24 VDC
- o 64 digital Inputs, 50 are for MCS, 14 free useable on safety plug's and Switches/detent for Simulation
- o 48 digital Output's, 24 DC / 0.5 A, 41 are for MCS, 7 free useable on safety plug's and LED
- o 4 analogous Input's, 0-10 V, Resolution 16 Bit, 1 are for MCS, 3 free useable on safety plug's and a Potentiometer for Simulation
- o 4 analogous Output's, 0-10 V, Resolution 16 Bit on safety plug's with voltage display
- o Execution time:48 ns (Bit operation), 58 ns (Word operation)
- o integrated High-Speed-Counter for countings up to 400 KHz
- o Word operations, addition's ....
- o Programm memory 250 KByte, Data 1 MByte
- o 16 KByte Marker, all useable as Holding marker adjustable
- o 2048 Timer, all remanent adjustable 10 ms till 9990 s
- o 2048 Counter, all remanent adjustable
- o Ethernet-connection (cable included)
- o programmable with PC-Software (TIA PORTAL Professional, included)
- o integrated Digital- and Analogous simulator
- o Integrated Top table device in Aluminum
- o SUB-D ports for 10 MCS-Module's (MCS-760)

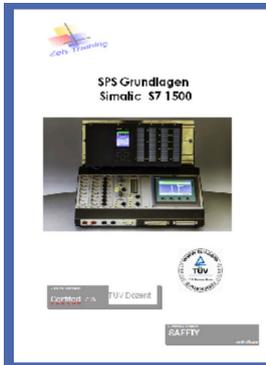
For other solutions like MCS-690, 700, 720, 730, 740, you can use this PLC and you can expand later to bigger solution like MCS-760.

Or we can quote you a smaller PLC solution direct for the MCS application!



# Teachware-1500

All Teachware are in paper form or on CD as word file: /P or /CD



Description

Order - No.

## Basic's

TEW-1500-1

Contents:

Basics, hardware S7 1500, construction technology, creation of a PLC program, programming, basic functions, memory commands, time and counting functions, test functions



## Project planning

TEW-1500-2

Contents:

Types of blocks, word processing, time and counting words, comparison functions, data blocks, temporary and static variables, parameterizable FCs and FBs, instance data blocks, multi-instance data blocks, block protection, analog value processing, organization blocks



## Ethernet networking

TEW-1500-3

Contents:

The Ethernet interface, the Profi-Net, Networking two CPUs S7 1500, Networking CPU with KTP 600, Networking S7 1500 with S7 1200, Decentralized I/O with ET 200S, Decentralized peripherals Profibus, Drive technology with frequency converter G120



## Visualisation

TEW-1500-4

Operate and observe with TIA Portal and KTP 400/600/700

Contents:

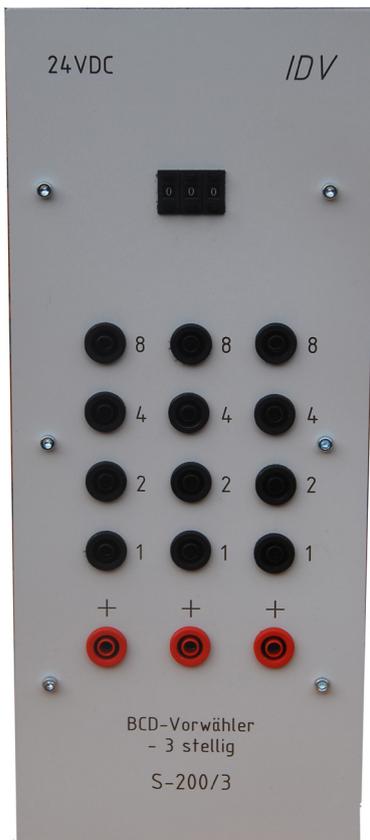
Operating and monitoring automation devices, Programming software TIA V13 and higher

Creating a project,

Project planning of input and output fields, bars, buttons, curves, graphics, buttons, color changes,

Configuring messages, recipes, configuring function keys, user administration

# PLC - Simulator's



Description

Order - No.

**BCD - Chooser**

**S - 200**

- o BCD - Chooser, 4-digits

The BCD-Chooser are using for variable processes in control technology. The number 0 - 9 shows in the BCD-Code on 16 Outputs for a easy reading in the PLC.

Example:

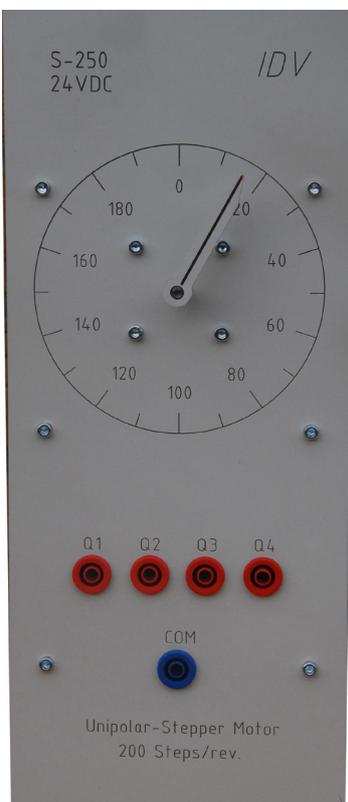
After push a start button a pneumatic cylinder works so many times as choosing on the BCD-Chooser.

Number of digital Inputs:

17

Number of digital Outputs:

1



**Stepper Motor**

**S - 250**

- o Unipolar - Stepper Motor
- o 200 Steps / Rotation
- o 24 VDC

Example:

With a extern start button we are start the stepper motor with a frequz of 50 Hz.

A second extern switch for the direction are choose the rotating direction (clockwise or anticlockwise).

The third extern switch means to stop the motor just in the moment when the stop signal a presented.

Number of digital Inputs:

3

Number of digital Outputs:

4

# PLC - Simulator's

## Stepper-motor control unit S - 255

- o for high frequency control of a stepper motor
- o Position, Rotation, Flagposition, Tact-Direction, Analog, Joystick
- o 0 till 50 KHz in Tact-/Direction mode
- o 0 till 25 KHz in all other mode's
- o 24 VDC
- o USB-Interface
- o 6 Input's (Opto coupler), 24 VDC
- o 3 Transistor Output's (open collector)
- o Current sinking adjustable from 0 till 100%
- o incl. Load condensator (importend for brake situations)
- o All connectors with 4 mm safety plugs
  
- o simply combination with the integrated Inputs-/ Outputs with a PLC or others (like LOGO) for many applications.
- o 16 Positions or Rotaion frequencies with the four Inputs are useable with a PLC or LOGO
- o incl. software



## Stepper motor positioning module S - 257

- o complete Modul consist of:  
Stepper motor, Linear unit with toothbelt drive,  
Measuring unit
- o Stroke = 500 mm
- o Control with a PLC or with our stepper motor control unit (S-255).
- o Max. Torque: 39,6 Ncm
- o  $I_{max}$ : 0,28 A each connection
- o Rotation till app. 1.000 Rpm
- o Linear translation: 54 mm/Rotation
- o integrable in Alu-subplate with 25 mm grid.
- o All connectors with 4 mm safety plugs

incl. Program example with PLC and Stepper motor control unit



# PLC - Simulator's

Description

Order - No.

**Machine control display**

**S - 260**



- o For Simulation of a complex machine control loop
- o 1 Main-switch
- o 2-digit Step-display (BCD)
- o Emergency-Stop-Switch
- o 2 Switches with detent
- o 12 push switches
- o 4 lamps
- o Connecting with 4 mm safety plugs

Example:

For every control loop, we need a control display. It's controlled some different comfortable control loop's: Automatic, Emergency-Stop, ect. and a show display to showing with different lamps: Step's, Interference, ect.

Number of digital Inputs: 15

Number of digital Outputs: 12



**Pt-100-Sensor**

**S - 265**

- o To connect to the temperature-Input of the PLC
- o 2-wire technology
- o with 4 mm sockets

Example:

Control in a flower house  
Analogous control technology for temperatures

Number of analogues Inputs: 1

# PLC - Simulator's

Description

Order - No.

<b>Delta-Star-Simulator</b>	<b>S - 400</b>
-----------------------------	----------------

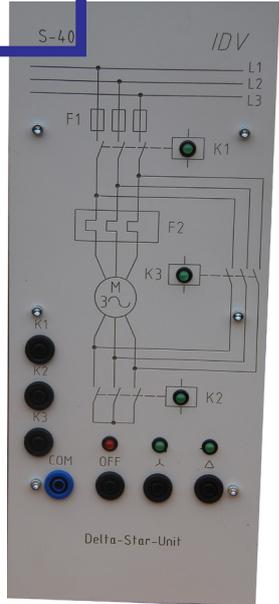
- o star triangle simulator      Three lamps  
Simulation of main contactor, star contactor and triangle contactor

Example:

A three-phase motor shall be switched at first in the star to the reduction of the residual current on a third opposite the direct connection in the triangle. From the point of view of time limited after this start becomes the machine then into triangle changed.

The switching states "end", "star" and "triangle" become about LED ' S shown. One over current fuse more thermally protects the engine against constant overload.

Number of the digital inputs:      7                      Number of the digital outputs:      7



<b>Relay-Safety relay unit</b>	<b>S - 405</b>
--------------------------------	----------------

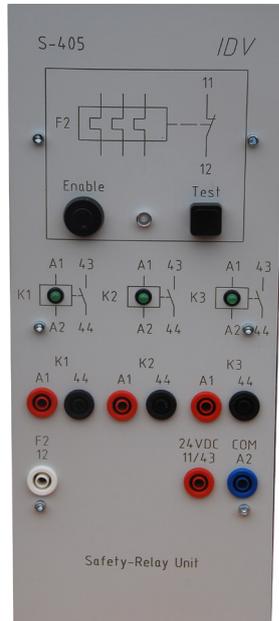
- o Additionally Simulator for S-400  
Practical delta-star control with contact control  
3 relays with the one NO contact  
1 fuse, manual operating and release, with a NC-contact

Example:

Starts in a control (e.g. delta-star, Motor start control) a disruptive incident, so is in a conventional control of (VPS) a faultless function given also, the contacts of the contactors carry out the function there.

One must with a PLC also perhaps. See appearing disturbances and trigger corresponding reports etc..

To convert around such questions in the reality is this simulator with the corresponding application case deduce.



<b>Pump-control-loop</b>	<b>S - 410</b>
--------------------------	----------------

- o Four pumps (LED)  
A three position switch (too high, too low, OK)

Example:

Four pumps are installed in a net as represented in the marginly. Through this one gradual to-or the print shall to switching off of the first two pumps be held in the net within a definite area.

An as similar as possible term shall and switching quantity of the two pumps are reached. The pump must so be switched off always which runs longest.

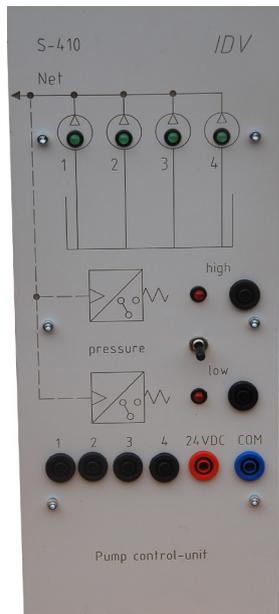
A reaction time must both at the add-on and when switching off be waited, before the next step to-or is switched off (5 seconds).

Pump 3 is for a possible peak demand installed then and always shall switched to be, if the two for first pumps already in operation is and after ten seconds still the report of the P-E transducer " print too low " reported is.

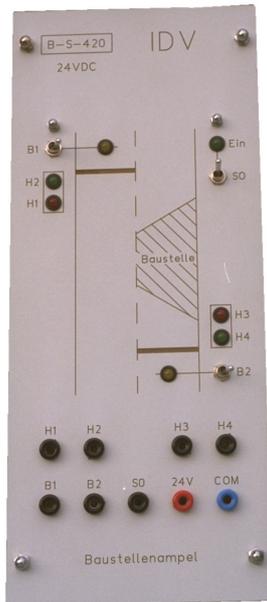
Pump 4 are a need pump which must be switched on always then if one the two first pumps or this one motor contactor, (waiting period 2 seconds) is cancelled during the operating.

The failure of a pump shall be questioned because of this about the motor contactor K1/K2 and reported about a respective external indication/acoustics.

Number of the digital inputs:      5                      Number of the digital outputs:      6



# PLC - Simulator's



Description

Order - No.

**Building site traffic light**

**S - 420**

- o Two Red-Green traffic lights
- o Two sensors report a car (Switch)

Example:

The complete motor traffic must be escorted about a lane at a building site traffic light.

The sensors B1 and B2 report the existence of one or several motor vehicles.

Well, the control must so react depending on need.

S0 shall with the external switch the plant one-and can be turned off.

Number of the digital inputs: 3

Number of the digital outputs: 4

**Starting motor control**

**S - 430**

- o four contactors (LED) for main and the three switch steps

Example:

To extend the initial torque and move the breakdown torque in dependence of the slip, the starting motor shall be switched for a slip-ring rotor into four steps.

Number of digital inputs: 3

Number of digital outputs: 9

**Conveyor belt control**

**S - 440**

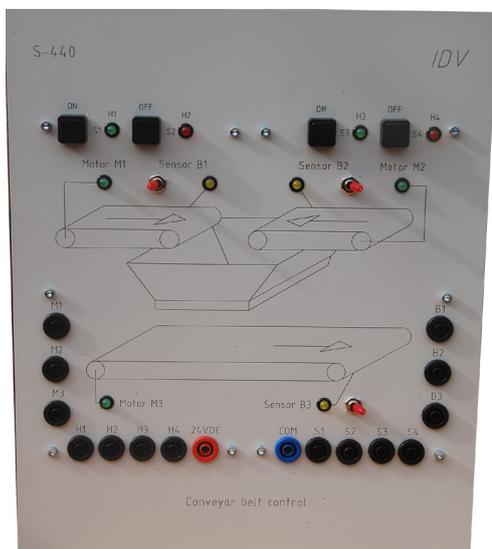
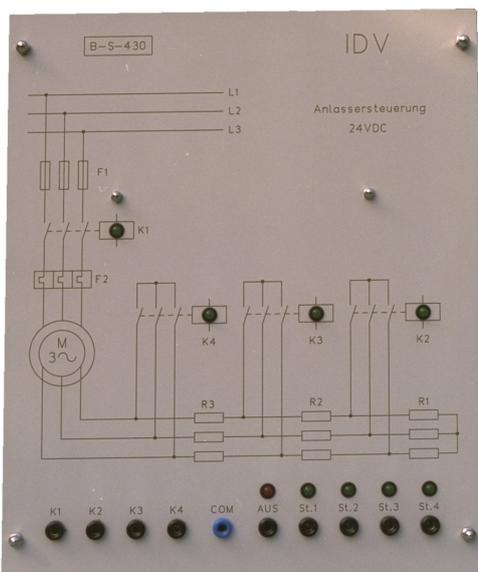
- o three ribbons
- o Two by hand starting
- o The third must in dependence for this one upper two ribbons steered are

Example:

In dependence of two conveyor belts and the push button switch ( ON, OFF ) shall the third conveyor belt be headed automatically. The sensors (B1 -- B3) can be used as to ask the pieces

Number of the digital inputs: 7

Number of the digital outputs: 7



# PLC - Simulator's

Description

Order - No.

## Pedestrian lights

S - 450

- o mutual traffic lights (red green) for pedestrians  
Mutual traffic lights ( red-yellow-green ) for car  
Two demand switches for the pedestrian

Example:

The pedestrian light shall in this day operation go at calling of a pedestrian automatically.  
In the night operation shall the set of traffic lights work into indicator circuit (yellow lights).  
The switchover from day- to night operation shall be carried out with an external switch.

Number of the digital inputs: 3      Number of the digital outputs: 5



## Fan control

S - 460

- o respect air suppliers (switches)  
Three air exhausters of (LED)  
Coded 7 segment indication

Example:

In a car park switched on depending on need to eight air supply ventilators ON ( by switches by hand ). Runs 1-3 air suppliers, air exhausters shall so one become switched too.  
Runs 4-6 air suppliers, two shall so become air exhausters switched too.  
Runs 7-8 air suppliers, all three shall so become air exhausters switched too.  
No order must be observed by hand but the control always shall recognize the number of the switched on air suppliers automatically.  
Supposed from wear and tear arguments get so controlled the air exhausters, this they also controlledly become switched too. Well one even load of three air exhausters.  
The number of the switched toos air exhausters shall be shown about the coded 7 segment indication.

A difficult formulation of a task which can be solved only with the word processing with a PLC.  
Also compare operations are to use.

Number of the digital inputs: 8      Number of the digital outputs: 7



## Colour mixed station

S - 465

- o Three color choose switches  
A maximum sensor (switches)  
A minimum sensor (automatic)

Example:

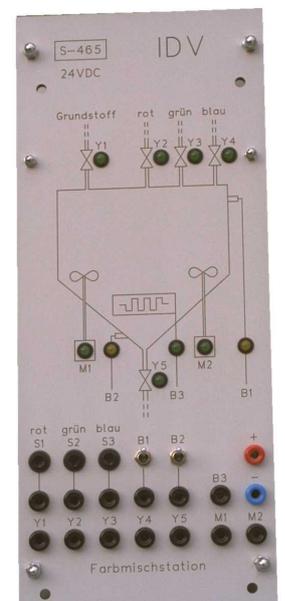
Colour shall be mixed in a retain bin. As soon as one of the three color choose switch (red, green, blue) is pressed, the motor of M1 and M2 and the radiator immediately shall start B3.  
As soon as the two mixers run, the raw material shall for the duration of 24s be filled about valve Y1. The corresponding valve shall for the colour for a duration after 8s then of be 8s opened also.

Is the complete raw material filled shall mixed further 30s still be. The colour then can Y5 drain about the drain valve.

After the PLC has switched ON Y5 reports the simulator after approx. 6s that the retain bin is empty again. The drain valve then becomes Y5 closed again after that and the mixers are switched off.

Musting as soon as the maximum sensor has effect close all supply valves of (Y1-Y4)

Number of the digital inputs: 5      Number of the digital outputs: 8





# PLC - Simulator's



Description

Order - No.

**Elevator**

**S - 490**

- o four levels
- o Cabine moved to all levels
- o Door opens with a looping light-simulation  
All lights are off: door is closed
- o Controlling with PLC
- o 2x 25 pol. SUB-D connectors

Example: left side

Digital inputs: 16

Analogue input: 1

for measure the position of the cabine with a ultrasonic Sensor (0-10 V)

Digital outputs: 24

Analogue Output: 1

to control the Speed of the cabin from 0 till 100% (0-10V)

Explanation of the different areas:

## Cabine:

4 switches (1, 2, 3, 4) for the calls.  
4 yellow LED's then (internal electronics)  
7-Segment indication shows the position  
(PLC-programming logic).

## Cabine:

4 calling switches for every level (4 DI)  
4 LED's reports the signals are stored (4 DQ)  
1 BCD Display to show the Position (4 DQ)

## Building:

In every level:  
1/2 switches to call the elevator (6 DI)  
4 Limit swiches for the Position (4DI)  
1/2 LED's show that the call is registered (6 DQ)  
2 LED's to show the direction of the elevator (2 DQ)  
4 LED's to show the position of the Elevator (4 DQ)

## Internal:

4 signal's to open the door in every level (4 DQ)  
2 Relay's to move the cabine in both direction  
(connected with direction LED's)  
2 signal's if the door is open or closed (2 DI)

## Analogue:

ultrasonic Sensor for Position (0-10V) (1AI)  
Motor Speed controller (0-10V) (1AQ)

Power supply: 24VDC



On the backside of the elevator are 4 devices to put the elevator into a DIN A4 frame like as in Electric Labs.

## Further Catalogue:

Didactic for Control technology in vocationals Engineers-Office de Vries

### Trainingssystem

### Pneumatics Electropneumatics

Didactic for Control technology in vocationals Engineers-Office de Vries

### Trainingssystem

### Hydraulics

Didaktik in Regelungs- und Steuerungstechnik Ingenieurbüro de Vries

### Trainingssystem Mechatronic MCS-800

### Flexible Production

Didaktik in Regelungs- und Steuerungstechnik Ingenieurbüro de Vries

### Mechatronic- Compact Trainings-System

### MCS

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### Seminars Control technology

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